



METRA CEILING ON TIMBER FRAMING CONSTRUCTION MANUAL



METRA – Take a closer look.

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BRANZ Appraised
Appraisal No.951 [2017]

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Related documents

New Zealand Standards

- NZS 3602:2003 Timber and Wood Based Products for Use in Building.
- NZS 3603:1993 Timber Structures Standard.
- NZS 3604:2011 Timber Framed Buildings.
- AS/NZS 1170:2002 Structural Design Actions.
- NZS 4218:1996 Energy Efficiency – Housing and Small Building Envelope

The METRA system has a BRANZ Appraisal, Certificate No. 364, for use under NZBC B2.3.1 (a) for 50 years durability. BRANZ have confirmed that METRA panels will meet the robustness intent of NZS 3602:2003

Foreword

Metra ceiling panel – 25mm thick, fine surface, moisture resistant particleboard, 7.35m x 2.45m.

The typical weight of a full 25mm thick sheet is 295kgs.

Compliance

The Metra Panel Construction System has a BRANZ Appraisal, Certificate No. 364, for use under the NZBC.

In the opinion of BRANZ, the Metra Panel Construction System will meet or contribute to meeting the following provisions of the New Zealand Building Code:

- **B1 STRUCTURE:** Performance B1.3.1, B1.3.2 and B1.3.4 for the relevant physical conditions of B1.3.3.
- **B2 DURABILITY:** Performance B2.3.1 (a), the Metra panel wall and ceiling system, not less than 50 years.
- **C1 OUTBREAK OF FIRE:** Performance C1.3.2.
NZBC Acceptable Solutions C/AS1 requires that foam plastics such as Expanded Polystyrene (EPS), which is an insulating material in the Metra Wall System, must be protected from direct exposure to fire. Metra wall panels, when joined with screw/nail fixed back blocking or metal strips, in accordance with the details in this manual, will satisfy the NZBC Acceptable Solution C/AS1 requirements as a flame barrier.
- **E2 EXTERNAL MOISTURE:** The system requires the addition of a building envelope to meet performance E2.3.2 and E2.3.6.
- **E3 INTERNAL MOISTURE:** Performance E3.3.1, E3.3.4. and E3.3.5.
- **F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1.
The System will not present a health hazard to people.
- **H1 ENERGY EFFICIENCY:** Performance H1.3.1 and H1.3.2.
- **STRUCTURAL AND DURABILITY TESTING**
The Metra System and its components have been extensively tested by a range of independent agencies.

Scope – Metra Ceiling

Scope

The Metra Construction System has been specifically designed in accordance with NZS 4203 to comply with the appropriate design loadings for domestic buildings.

Roof construction is conventional and is based on trusses. Trusses must be designed by an engineer experienced in truss design in accordance with the requirements of Clause 10.2.2 of NZS 3604: 2011. Roof claddings must be one of those specified in Paragraph 3.2 of NZBC Acceptable Solution E2/AS1.

All details of the system and components are suitable for timber framed buildings within the scope of NZS 3604:2011, Clause 1.1.2 – with the following departures:

Interpretation

Interpretation shall be as detailed in NZS 3604:2011, clause 1.2.

Definitions

The following definitions are additional to those given in NZS 3604:2011, Clause 1.3.

ANGLED FASTENING – nails are angled when they are driven through a panel or batten into a supporting member.

CEILING STRAP (CP1) – a galvanised 50 x 1.2mm steel ceiling strap used to connect ceiling panels together.

CEILING CLIP – a galvanised 2mm thick right angle bracket used to connect ceilings to truss bottom chords.

PANEL – a large piece of board cut to the shape required to form part of a ceiling.

SHEET – a sheet of painted 25mm wood based material used in creating the Metra Ceiling System.

SKEWED – skew nails are driven at opposite angles to each other through the edge of a panel into another member.

SQUARE DRIVE SCREWS – 25mm x 8g zinc chromate coated screws used in ceiling fixings.

SQUARE PLATE – a galvanised 200 x 200mm x 2mm steel plate to connect Metra ceiling panels to Metra ceiling panels.

STURDI BOND – heavy-duty construction adhesive used in wall to wall and ceiling to ceiling connections.

U-CHANNEL – a 600mm long x 1.2mm thick channel screw fixed across ceiling straps (CP1) when a ceiling joint is between trusses.

General

Materials description

Metra Ceiling Panels – Physical Properties

Board		25mm Ceiling Panels	
Board Size		7350 x 2440mm	
Weight per Board		288 kg	
Weight per m2		16.0 kg	

CEILINGS

25mm Metra ceiling panels are manufactured with a nominal density of 635 kg/m³.

- Full sheets are 7350mm long x 2440mm wide x 25mm thick.
- Ceiling sheets are generally supplied full size and cut to fit on site.
- Ceiling sheets may be supplied with tongue and groove edges and plastering chamfer for jointing.

PAINT

The primer paint applied to the panel faces and edges will resist water entering the board during the construction period. Any disturbance of this coating, i.e. cuts or damaged areas must be re-primed, except once holes are drilled after the roof is in place and there is no further risk of moisture damage.

HARDWARE & SUNDRY ITEMS

The items used to assemble the structure may be ordered with the kitset. These include:

- Ceiling strap (CP1)
- Ceiling clips
- Ceiling U-channel
- Ceiling square plates
- Adhesive
- Ceiling screws
- Touch-up sealer/primer paint
- Vented soffits
- Vent boxes

Metal structural components are manufactured from galvanised steel, are zinc plated, hot dip galvanised or primer painted to an appropriate standard so as to best resist corrosion. In all cases fixing components must meet the minimum requirements of Section 4 of NZS 3064: 2011

Weather exposure

The maximum weather exposure period of panels must not exceed 28 days. Roof cladding should be installed as quickly as possible after the trusses are fixed, preferably within 14 days and within a maximum of 28 days. Longer periods may cause the panel to swell. If exposure is likely to exceed this period, then temporary covering with tarpaulins or similar must be installed.

NOTE: All site cut edges shall be painted with the sealer/primer paint supplied with the kitset.

Maintenance

To comply with the 50 year durability required by the NZBC, Metra panels must be kept dry after close-in. The external envelope must be maintained to prevent ingress of water and internal water sources such as leaks must be repaired promptly.

If damage due to prolonged wetting does occur, contact Metrapanel Limited for guidance with repair or replacement methods.

Workmanship & tolerances

It is important that floor platforms are of the correct dimension and are flat, straight, parallel, square and set to the exact level.

As a guide recommended tolerances based on NZS 3604 Table 2.1 are shown below:

- Deviation from line in plan
 - 1 – In any length up to 10 m – 5mm
 - 2 – In any length over 10 m – 10mm total
- Deviation from horizontal
 - 1 – In any length up to 10 m – 5mm
 - 2 – In any length over 10 m – 10mm total

Trusses

In order to achieve a flat ceiling it is critical that trusses **NEVER** have more than 12mm upward deviation from flat and level.

Trusses should **NEVER** have **ANY** deviation downwards from flat and level. This will cause a hollow in the ceiling which cannot be avoided.

Site requirements

Preparation before assembly of panels

1. It is the responsibility of the installing contractor and franchise builder to verify that the floor platform dimensions shown on the consent drawings are correct.
2. Clear crane truck access to a suitable and safe unloading position around the site must be provided.
3. The installing contractor must ensure construction site safety signage is in place prior to the crane truck arrival and that all site staff are wearing safety hats and boots during panel unloading.
4. It is the responsibility of the installing contractor and franchise builder to provide a safe and firm ground surface for the crane truck to access and exit the site.
5. A full safety briefing must be undertaken prior to the unloading of any panels.
6. Site installation and construction should always be undertaken with a sufficient number of competent staff. We would suggest this would involve no less than four team members (including the truck driver/crane operator).

NOTE: Refer to the Metra Panel Lifting Procedure for details of:

- *Truck access requirements*
- *Site safety briefing*
- *Panel lifting procedures*

Durability

Refer BRANZ Appraisal No. 951 (2017)

As a result of the latest edition of NZS 3602:2003 being adopted as the Acceptable Solution for Durability under the New Zealand Building Code, BRANZ have updated their durability opinion for the Metra panel.

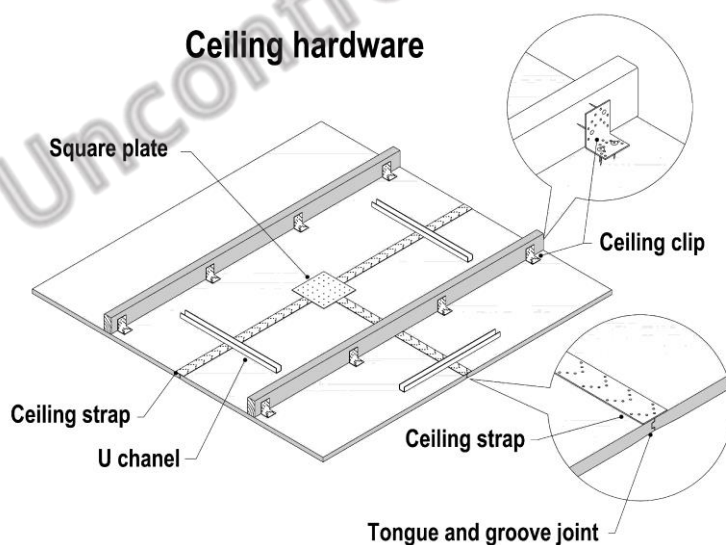
“The update addresses the robustness required for exterior and other framing by NZS 3602 for exposure to moisture due to cladding leaks which will allow time for detection and repair. NZS 3602 has been adopted in the amendment to NZBC B2/AS1.

Installation

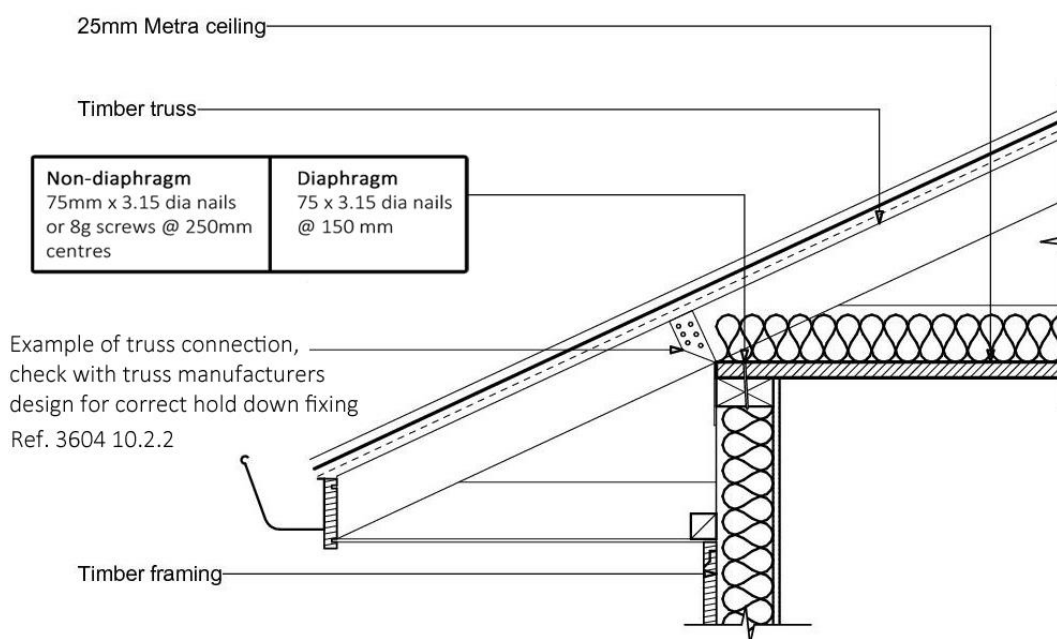
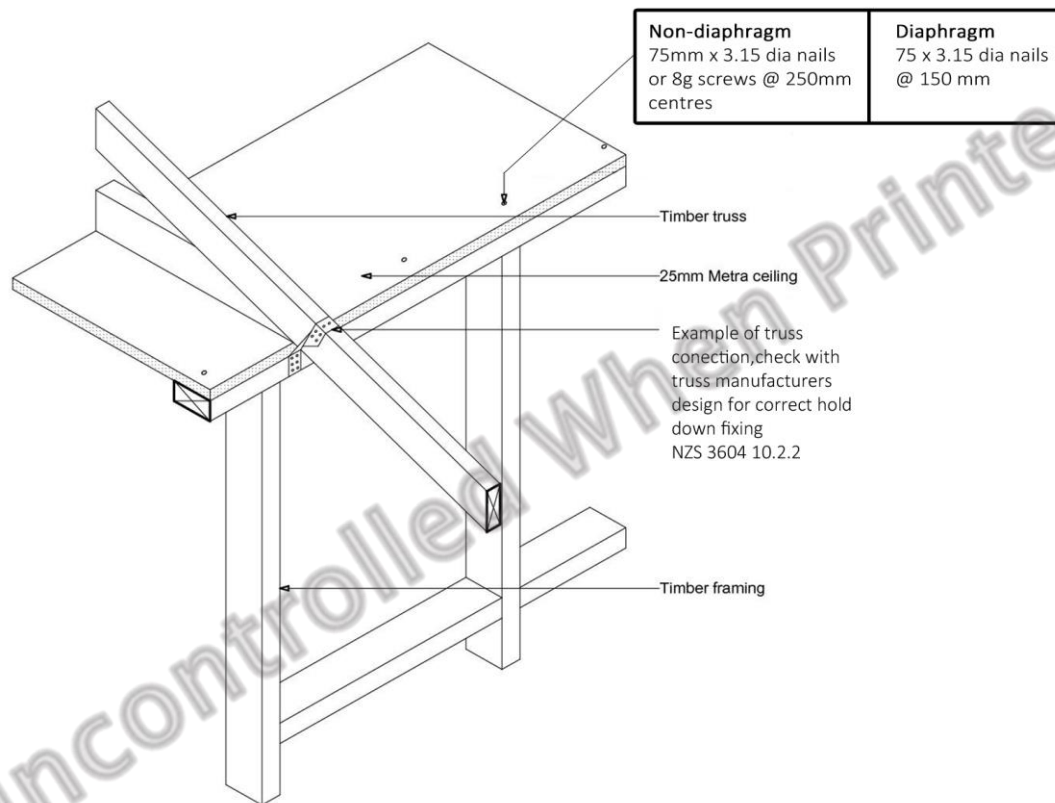
Ceiling panels are installed on temporary supports and fixed on top of wall framing, prior to the installation of roof trusses.



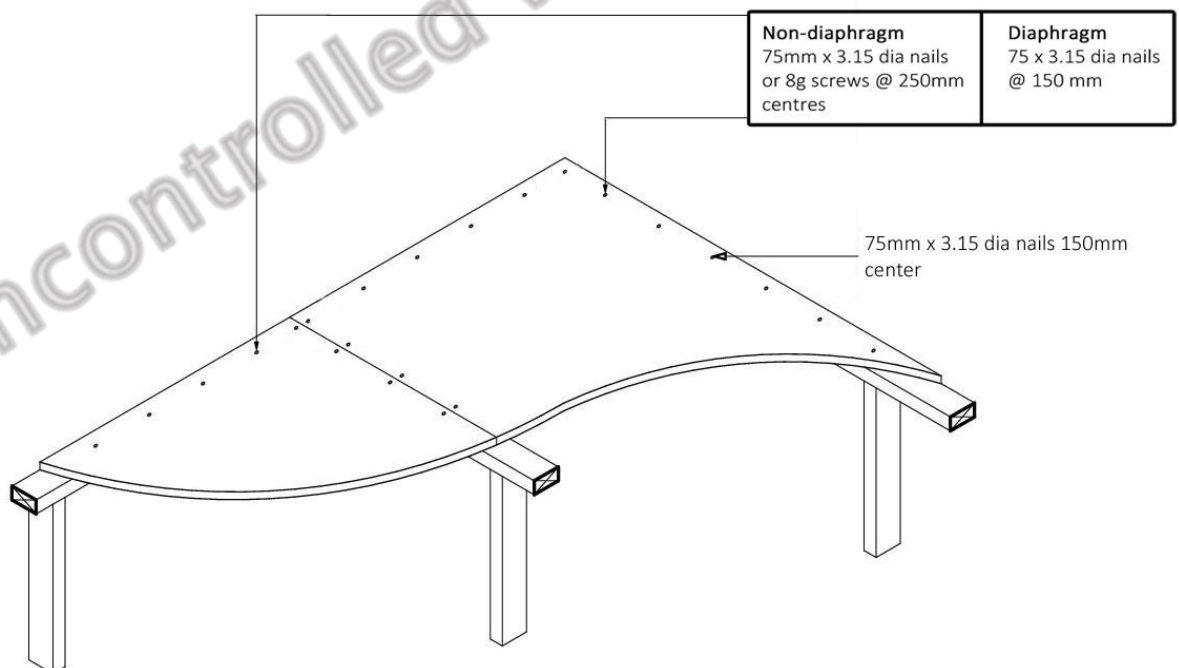
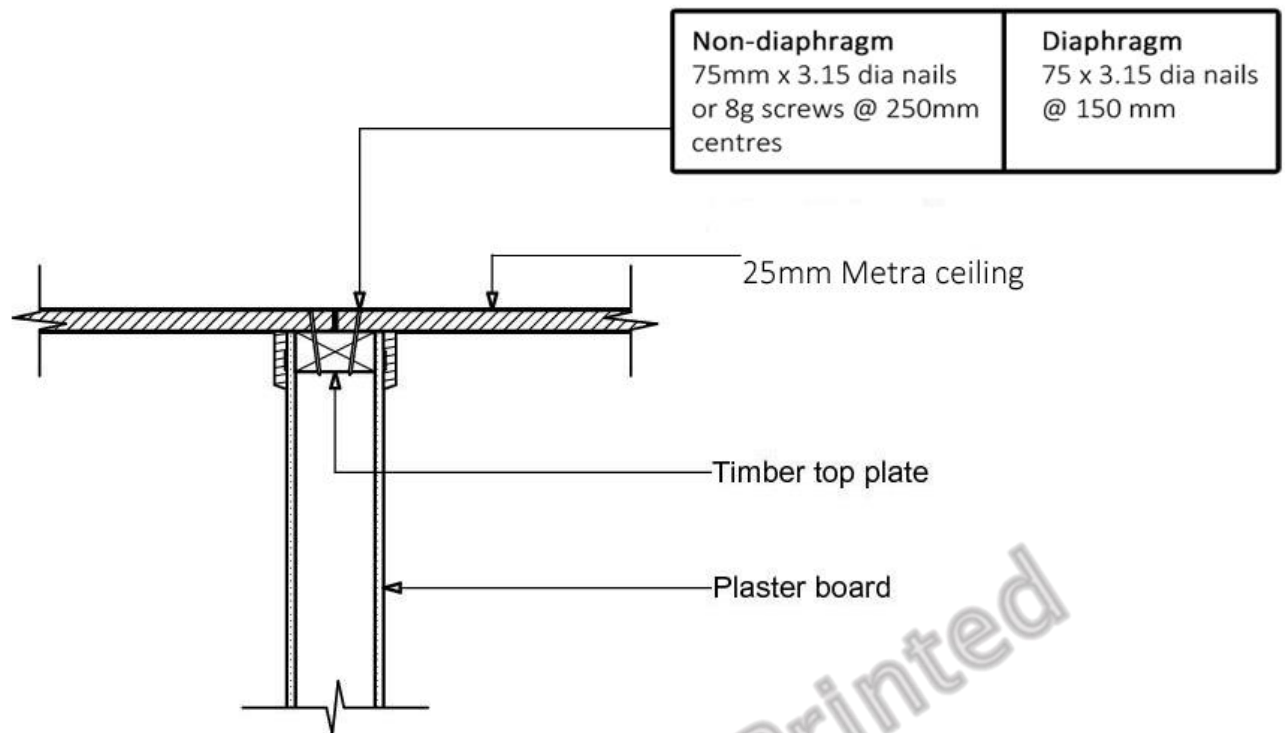
All ceiling fixing are from above.



Metra Ceiling Fixing to Timber Frame



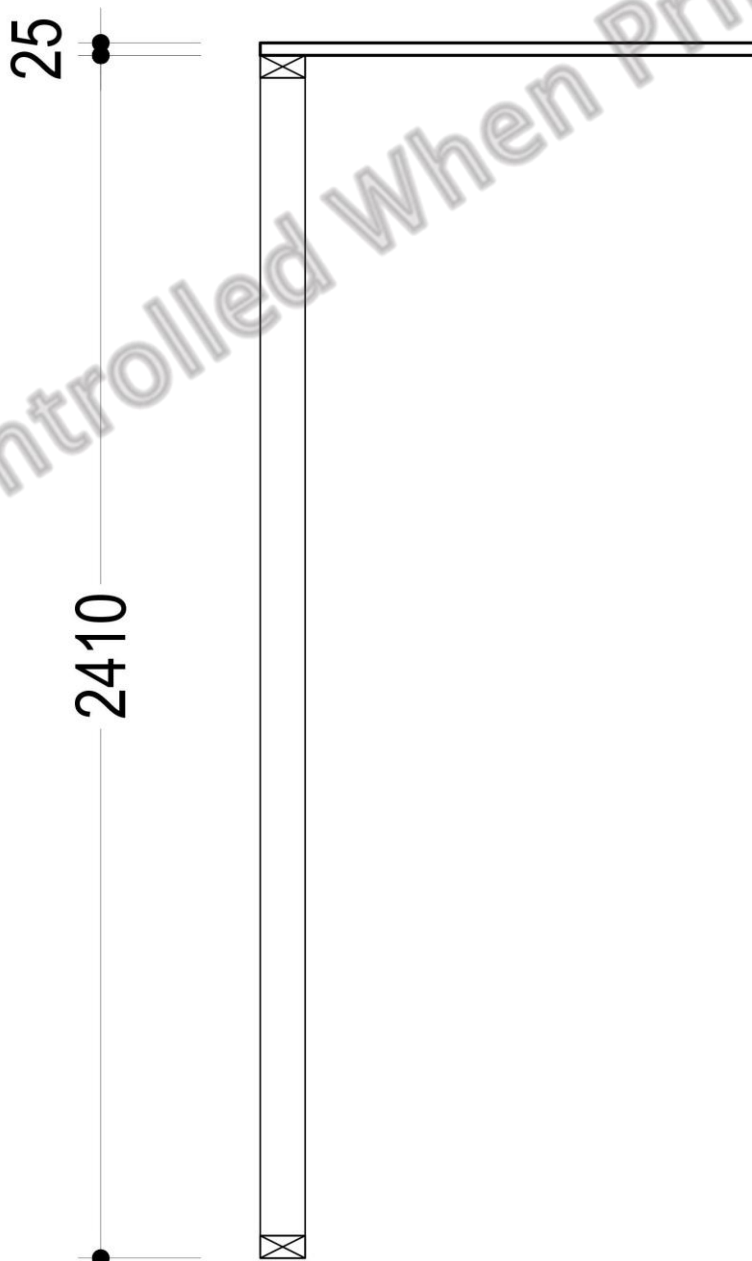
Fixing Details and Spacing



NOTE: As most framing heights are determined by the standard wall lining sizes (2420, 2570, 2720) which allow for the ceiling lining coming down inside the room.

As the Metrapanel ceiling sits on top of the framing the wall height can be reduced by 10mm. This will in turn reduce the soffit height by 20mm as the truss sits on a 25mm ceiling instead of a 35mm plate packer.

In this example the framing is 2410mm from under the bottom plate to over the top plate. This allows for two standard 1200mm sheets of plasterboard wall lining with a 10mm gap at the base.



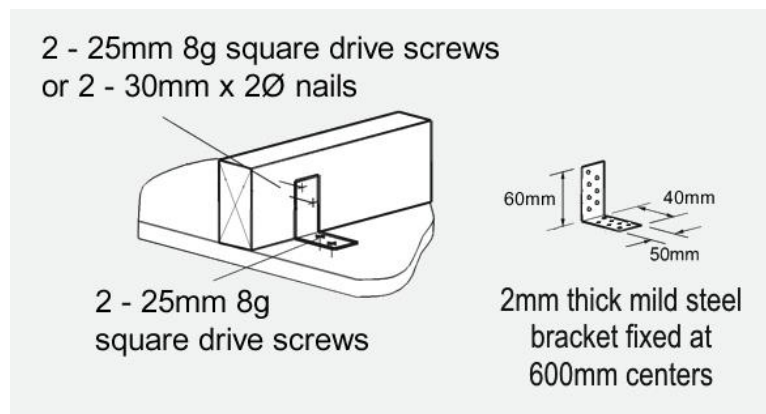
Ceiling Panel Joints

When panel joints do not coincide with trusses, butt joints are formed supported by a metal strip as detailed



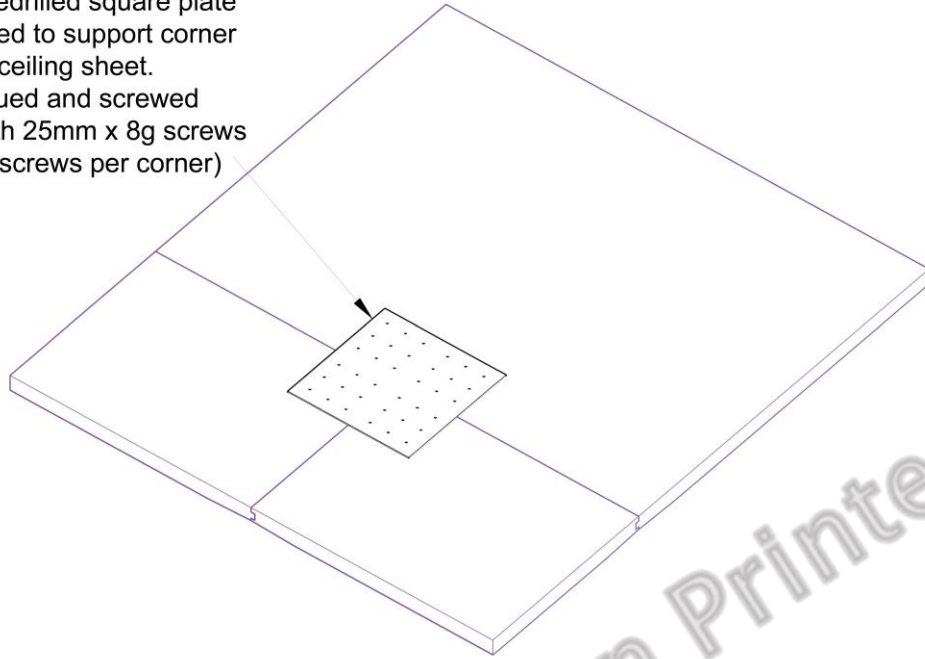
Ceiling Butt Joint

NOTE: Where roof truss cambers are more than 10mm the ceiling to truss cleats shall not be fixed to the trusses until all roof framing and cladding has been installed, and the trusses have settled to within 10mm of their final level. To protect the panel from unnecessary exposure to the elements, during inclement weather, the installation of ceiling panel cut outs should be deferred until dry conditions prevail.



Ceiling to Truss Fixing

Predrilled square plate
fitted to support corner
of ceiling sheet.
Glued and screwed
with 25mm x 8g screws
(8 screws per corner)



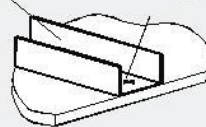
Stiffening Plate Joint

When sheet joints fall more than 300mm from the truss, in addition to the metal strip, a steel stiffening channel is fixed across the joint at 1200mm centres.

Folded steel channel stiffeners at 1.2m centers
when joint is more than 300mm from truss

600 long x 1.2mm thick
channel when joint is
between trusses

25mm x 8g screws
@ 100mm centers



Butt Joint Stiffener

Truss Spacing

Trusses shall be at 900mm maximum centres.

NOTE: It is strongly recommended that installation of the roof is completed as quickly as practicable. Confirmation of roof required should be made a minimum of one month before construction commences, with a follow up acknowledgment the day before wall erection and ceiling installation.

This should help in reducing unnecessary exposure of the panels.

Truss anchorage

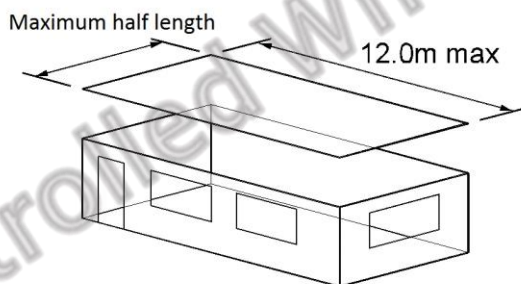
The fixing of trusses at supports shall be as given by the truss design but not less than that required by the appropriate tables of NZS 3604 Section 10.

Truss wind uplift fixing requirements including capacity are detailed in NZS3604 Section 10 Types A, B, C, D and E.

Ceiling Diaphragm

The board ceiling acts as a diaphragm. Ceiling braces, such as shown in NZS 3604 Fig 10.23 are not required.

The panel ceiling acts as a diaphragm up to 12m long provided it is fixed to wall panels and trusses in accordance with the Metrapanel details. The minimum sheet size within the diaphragm is 2400 x 1200mm.



The length of the diaphragm shall not exceed twice its width

Ceiling Diaphragm

Roof Plane Bracing

For roof plane bracing requirements, refer to Clauses 10.3.4 and 10.3.5 of NZS 3604:2011.

Roof Space Braces are not required.

Roof Insulation

NZBC Clause H1 (Energy Efficiency) adopts NZS 4218:2004 as the Acceptable Solution. The Standard cites two methods of compliance – Schedule Method and Calculation Method. The Schedule Method is used in this manual but the Calculation Method may be used where minimum R values are hard to achieve. In both of these cases, the minimum values given in NZS 4218 have been adjusted by NZBC Clause H1.

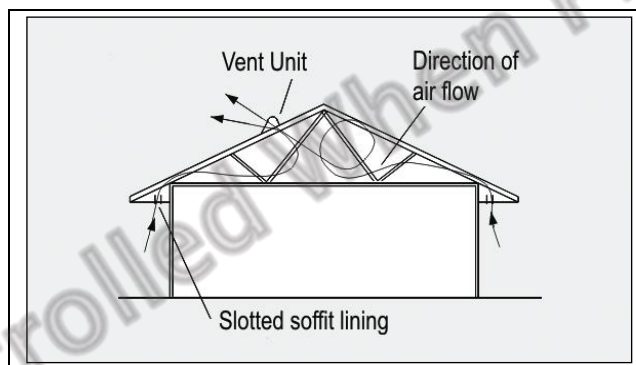
The schedule method described in NZBC Clause H1 and NZS 4218 gives minimum thermal resistance values for different locations throughout New Zealand, and these will meet the internal moisture and energy efficiency performance requirements of the NZBC. However, if the Calculation Method is used it must be ensured that the internal moisture requirement continues to be met.

The Climate Zones are defined in NZBC Clause H1 Energy Efficiency.

Roof space ventilation

Elevated temperatures with exceedingly low humidity are prevalent in ceiling roof spaces and plenum areas. As these are immediately adjacent to the ceiling panels Metrapanel recommend roof space ventilation be provided.

Efficient cross-flow ventilation must be achieved within the roof spaces to reduce temperature and improve ceiling insulation performance in the summer, and control moisture in the winter. This ventilation, requirement is managed through soffit, roof apex and or via gable end venting,



Roof Space Vents

STOPPING PROCESS

The process for stopping Metra panels is:

Steps	Description
1	Remove all glue from the join with a sharp chisel
2	Paint any exposed RAW Metrapanel with the supplied Metrapanel Primer Paint
3	Brush all joins well with a stiff brush to remove any dust or flakes of paint
4	Apply CEMIX CEMKEY mixed as per the manufactures instructions, to all joins using a paint roller going across the joint to ensure that complete coverage is achieved into the tapered join, 150mm either side of the centre of the join is adequate
5	Apply base coat of plaster, either Gib Tradeset 90 or USG Sheetrock Easysand 90 . DO NOT USE MACHINES for stopping onto Metrapanel.
6	Taping of joints is not essential but if the contractor wishes to put tape into the joint use only Fibrefuse tape .
6a	If using tape push the tape into the first application of bedding plaster then apply more plaster over the top of the tape
7	Once the first application is completely dry scrape or sand away any air bubbles or ridges and then apply second coat of stopping using the same compound as the first.
8	Once this is completely dry give it a light sand to prepare for topping
9	Top using Gib Trade finishing Multi or USG Sheetrock Drywall Topping Compound – do not use light compounds as they are too soft and get hollows too easily when sanding
10	Once this is completely dry it is important that the plaster is sealed using the Metrapanel oil bases sealer supplied
11	For square stop use paper tape folded to form the corner and apply in the same way ensuring that there is CEMKEY on the panel first and there is enough plaster under the tape to get a good bond. The paper tape can also be folded and PVA glued into the corner ensuring complete coverage of the tape with the PVA. Any excess can be washed away with a wet cloth
12	For cove, use an MDF or timber scotia and PVA to the GB/Ceiling junction before mechanically fixing with brad nails at 300mm centres
12a	If GIB cove is going to be used, CEMKEY should be applied before the cove adhesive

